

1. A method of making an electrode decal, comprising:

forming a catalyst ink comprising a catalyst compound, a perfluorinated sulfonyl fluoride polymer, and an ester;

disposing the catalyst ink on a decal; and

drying the catalyst ink to form an electrode layer on the decal.
2. The method of Claim 1, wherein the ester is synthesized from acetic acid.
3. The method of Claim 1, wherein the ester is n-propyl acetate.
4. The method of Claim 1, wherein the ink further comprises polyvinyl alcohol.
5. The method of Claim 4, wherein in the ink comprises about 20 wt% to about 30 wt % of the catalyst compound, about 15 wt% to about 20 wt % the ester, about 40 wt% to about 50 wt% perfluorinated sulfonyl fluoride polymer, and about 5 wt% to about 10 wt% polyvinyl alcohol, wherein the weight percentages are based on the total weight of the ink.
6. The method of Claim 5, wherein the catalyst compound comprises platinum and the ester isn-propyl acetate.
7. The method of Claim 1, wherein the catalyst ink has a density of about 0.5 g/ml to about 5 g/ml..
8. The method of Claim 1, wherein the catalyst component has a particle size of about 10 nanometers to about 100 nanometers
9. The method of Claim 9, wherein the particle size is about 15 nanometers to about 50 nanometers.
10. The method of Claim 1, wherein the catalyst compound is selected from the group consisting of platinum, palladium, rhodium, carbon, gold, tantalum, tungsten, ruthenium, iridium, osmium, and an alloy and combination comprising at least one of the foregoing catalyst compounds.

11. A method of making a membrane electrode assembly, comprising:

forming a catalyst ink comprising a catalyst compound, a perfluorinated sulfonyl fluoride polymer, and an ester;

disposing the catalyst ink on a decal;

drying the catalyst ink to form an electrode on the decal;

transferring the electrode onto a first side of a proton exchange membrane, wherein the electrode is in ionic communication with the first side and wherein the catalyst compound loading on the proton exchange membrane is less than or equal to about 1.5 mg/cm^2 .
12. The method of Claim 11, wherein the ester is synthesized from acetic acid.
13. The method of Claim 11, wherein the ester comprises n-propyl acetate.
14. The method of Claim 11, wherein in the catalyst ink comprises about 20 wt% to about 30 wt % of the catalyst compound, about 15 wt% to about 20 wt % of the ester, and about 40 wt% to about 50 wt% of the perfluorinated sulfonyl fluoride polymer, and wherein the weight percentages are based on the total weight of the ink.
15. The method of Claim 11, wherein the catalyst ink further comprises polyvinyl alcohol.
16. The method of Claim 15, wherein the catalyst ink comprises about 5 wt% to about 10 wt% of the polyvinyl alcohol, wherein the weight percentages are based on the total weight of the ink.
17. The method of Claim 11, wherein the catalyst ink has a density of about 0.5 g/ml to about 5 g/ml.
18. The method of Claim 11, wherein the catalyst compound is selected from the group consisting of platinum, palladium, rhodium, carbon, gold, tantalum, tungsten, ruthenium, iridium, osmium, and an alloy and combination comprising at least one of the foregoing catalyst compounds.

19. The method of Claim 11, wherein the loading is about 0.8 mg/cm^2 to about 0.5 mg/cm^2

20. The method of Claim 11, wherein the electrode is cable of having a lateral electrical resistance of less than or equal to about 10 Ohms.

21. The method of Claim 20, wherein the lateral electrical resistance is less than or equal to about 5 Ohms.